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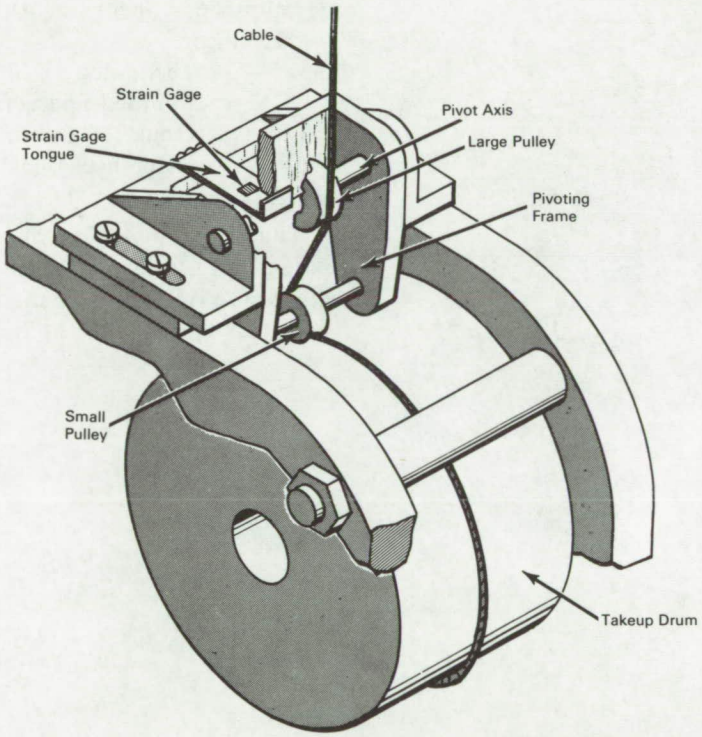
# NASA TECH BRIEF



## Mechanism Continuously Measures Static and Dynamic Cable Loads




**The problem:**

To devise a mechanism that will measure the tensile loads on a cable under static and dynamic conditions, without disturbing the continuity of operation of the system. Prior methods using load cells and other load measuring instruments require temporary interruption of the cable system for in-line installation. Cumbersome electrical lines, which are often required for the instrumentation, may become tangled if there is any appreciable movement of the cable being tested.

**The solution:**

A mechanism consisting of a set of takeoff pulleys mounted on a pivoted frame that is linked to a strain gage which measures the frame displacement as a function of the static or dynamic tensile load on the cable.

**How it's done:**

The pivoting frame has a small pulley mounted at its lower end, and a larger pulley at its upper end. This frame is mounted on a support containing a strain

(continued overleaf)

gage. The entire assembly is mounted over the takeup drum of a cable turn-control motor. The pulleys are arranged relative to the drum so that the cable makes a fixed angle at the points of incidence to and departure from the small pulley. The load on the small pulley will therefore be proportional to the load on the cable. An increasing load on the cable transmitted through the small pulley causes the frame to swing about the pivot axis and deflect the strain gage tongue downward in proportion to the cable load. The resulting output from the strain gage can be continuously monitored to give direct readings of the cable load. The two pulleys on the pivoting frame are free to translate on their axes of rotation in order to allow proper positioning of the cable as it traverses the takeup drum during winding or unwinding.

**Notes:**

1. As a possible modification, a third pulley might be added to the two-pulley assembly. As the takeoff angle is a critical factor in calibrating the mechanism, the third pulley would be made adjustable in accordance with the anticipated load it is to carry. Under heavy load, the added pulley would be set approximately in the plane of the other pulleys, so that only a small component of the main load is applied to the strain gage. Under light loads, the third pulley would be set nearly perpendicular to the other two pulleys, in order to maximize the load on the strain gage.
2. This mechanism could be used to monitor the tensile load on any material, including cable, wire, sheet metal, fabric, and paper, that can pass through a series of rollers.
3. Inquiries concerning this invention may be directed to:

   Technology Utilization Officer
   Manned Spacecraft Center
   Houston, Texas, 77001
   Reference: B66-10107

**Patent status:**

This is the invention of a NASA employee and a patent application has been filed. Inquiries concerning license rights may be made directly to the inventor, Mr. Thomas Grubbs, at Manned Spacecraft Center.

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